

## Claims

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1. A method for expanding cell coverage in mobile communication system comprising the steps of:
- 5       a) shifting a preamble access window by advancing a transmission signal by a first delay time in order to acquire a first call access signal from a mobile station at a remote distance; and
- b) delaying a second call access signal from a mobile  
10       station at a short distance by a second delay time in order to acquire the second call access signal.
2. The method as recited in claim 1, wherein said step  
a) includes the step of expanding a length of the preamble  
15       access widow to a maximum value by adjusting a length of chips included in the transmission signal.
3. The method as recited in claim 1, wherein said step  
b) includes the steps of:
- 20       determining whether the second call access signal from the mobile station is acquired by the preamble access window; and
- accessing the second call access signal to the preamble access window by delaying the second call access signal if  
25       the second call access signal is not acquired.
4. The method as recited in claim 1, wherein the first delay time is substantially equal to the second delay time.
- 30       5. The method as recited in claim 3, wherein the second call access signal is delayed by a feedback delay.

6. A method for expanding cell coverage in mobile communication system including at least a base station and a plurality of mobile stations, the method comprising the steps of:

- 5       a) expanding a length of a current preamble access window to a predetermined value;
- b) determining the mobile station is within a cell coverage covered by the preamble access window;
- c) shifting the preamble access window by advancing a  
10       transmission signal by a first delay time in order to acquire at least a mobile station when the mobile station is out of the cell coverage; and
- d) delaying a second call access signal from a mobile  
15       station at a short distance in order to acquire the second call access signal.

7. The method as recited in claim 6, wherein said step d) includes the steps of:

- determining whether the second call access signal is  
20       acquired by the preamble access window; and
- accessing the second call access signal to the preamble access window by delaying the second call access signal if the second call access signal is not acquired.

25       8. The method as recited in claim 6, wherein the first delay time is substantially equal to the second delay time.

          9. The method as recited in claim 7, wherein the second call access signal is delayed by a feedback delay.

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10. An apparatus for expanding cell coverage in mobile communication system including a plurality of mobile

stations and at least a base station, comprising:

transmitting means for transmitting a transmission signal advanced by a first delay time in order to acquire the transmission signal from a mobile station at a remote distance; and

receiving means for receiving and delaying a received signal from a mobile station at a short distance by a second delay time in order to acquire the received signal.

10 11. The apparatus as recited in claim 10, wherein said transmitting means includes:

means for generating a call access signal;

means for modulating the first call access signal on basis of pseudo noise signal and generating the transmission signal; and

means for advancing the transmission signal by the first predetermined time by controlling the pseudo noise signal.

20 12. The apparatus as recited in claim 10, wherein said receiving means includes:

means for delaying the received signal by a first predetermined time; and

means for demodulating the delayed received signal and restoring the call access signal.

13. The apparatus as recited in claim 10, wherein the first delay time is substantially equal to the second delay time.

14. The apparatus as recited in claim 12, wherein the second call access signal is delayed by a feedback delay.

15. A method for expanding cell coverage applied to a mobile communication system, the method comprising the steps of:

5       a) expanding a length of a current preamble access window to a maximum value;

          b) setting operation parameters related to time advance in order to acquire a first call access signal from a mobile station at a remote distance when the mobile  
10       station is out of the cell coverage; and

          c) acquiring a second call access signal from a mobile station at a short distance within the preamble access window by delaying the second call access signal.

15       16. The method as recited in claim 15, wherein said step c) includes the steps of:

          determining whether the second call access signal is acquired within the preamble access window;

          accessing the second call access signal to the preamble  
20       access window by delaying the second call access signal if the second call access signal is not acquired; and

          accessing the second call access signal to the preamble access window if the second call access signal is acquired.

25       17. The method as recited in claim 16, wherein the operation parameters include a preamble pseudo noise off set used for expanding the cell coverage.

          18. The method as recited in claim 16, wherein the  
30       operation parameters include a transmission time advance fine adjust value used for expanding the cell coverage.

19. A method for expanding cell coverage applied to a mobile communication system, the method comprising the steps of:

5 a) expanding a length of a current preamble access window for access probe to a maximum value;

b) shifting the preamble access window by setting operation parameters in order to acquire a first call access signal from a mobile station at a remote distance when the mobile station is out of the expanded preamble  
10 access window; and

c) acquiring a second call access signal from a mobile station at a short distance within the preamble access window by delaying the second call access signal by a feedback delay which makes the second call access signal  
15 have a different delay value on basis of a distance between a location of the mobile station and a location on a cell radius.

20 20. The method as recited in claim 19, wherein said step a) includes the steps of:

initializing a delay value and a number of delay of the feedback delay; and

25 setting the length of the preamble access window as a maximum value.

21. The method as recited in claim 19, wherein the cell radius is expanded 45 Km or more in said step b).

30 22. The method as recited in claim 19, wherein said step c) includes the steps of:

receiving the second call access signal;

delaying the second call access signal for a

predetermined time by feeding back the second call access signal by a certain number;

5 determining whether the second call access signal or the delayed signal are acquired within the preamble access window;

performing a call access if the second call access signal or the delayed second call access signal is acquired within the preamble access window; and

10 stopping a call access if not.

23. The method as recited in claim 22, wherein the operation parameters include a preamble pseudo noise offset used for expanding the cell coverage.

15 24. The method as recited in claim 22, wherein the operation parameters include a transmission time advance fine adjust value used for expanding the cell coverage.

25 25. The method as recited in claim 22, wherein the second call access signal is substantially delayed for 20 $\mu$ s by the feedback delay.

26. A computer readable media storing a method for expanding cell coverage applied to a mobile communication system, the method comprising the steps of:

25 a) expanding a length of a current preamble access window to a maximum value;

30 b) setting operation parameters in order to acquire a first call access signal from a mobile station at a remote distance when the mobile station is out of the cell coverage; and

c) acquiring a second call access signal from a mobile

station at a short distance within the preamble access window by delaying the second call access signal.

27. A computer readable media storing a method for  
5 expanding cell coverage applied to a mobile communication system, the method comprising the steps of:

a) expanding a length of a current preamble access window for access probe to a maximum value;

b) shifting the preamble access window by setting  
10 operation parameters in order to acquire a first call access signal from a mobile station at a remote distance when the mobile station is out of the expanded preamble access window; and

c) acquiring a second call access signal from a mobile  
15 station at a short distance within the preamble access window by delaying the second call access signal by a feedback delay which makes the second call access signal have a different delay value on basis of a distance between a location of the mobile station and a location on a cell  
20 radius.